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UTILITY PATENT APPLICATION TRANSMITTAL



July 21, 2000

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First-Named Inventor or Application Identifier	TONG, et al.		
Title:	CONTROLLING TRANSMIT DUTY CYCLE BY POSITION OF COVER		
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(Only for new nonprovisional applications under 37 CFR 1.53(b))

APPLICATION ELEMENTS (see MPEP chapter 600 concerning utility patent application contents)	ADDRESS TO:	Assistant Commissioner for Patents Box Patent Application Washington, D.C. 20231
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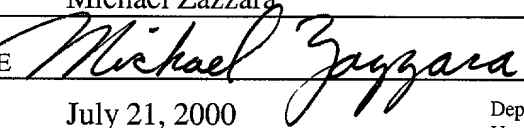
1.	<input checked="" type="checkbox"/> Fee Transmittal Form <i>in duplicate</i>	
2.	<input checked="" type="checkbox"/> Specification	Total Pages: <input type="text" value="6"/>
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	a. <input checked="" type="checkbox"/> Newly Executed (original or copy)	
	b. <input type="checkbox"/> Copy from prior application (37 CFR §1.63(d)) (for continuation/divisional with Box 17 completed)	
	i. <input type="checkbox"/> <u>Deletion of Inventor(s):</u> Signed statement attached deleting inventor(s) named in the prior application (see 37 CFR §1.63(d)(2) and 1.33(b))	
5.	<input type="checkbox"/> Incorporation by Reference (<i>useable if Box 4b is checked</i>) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.	
6.	<input type="checkbox"/> Microfiche Computer Program (Appendix)	
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ACCOMPANYING APPLICATION PARTS

8.	<input checked="" type="checkbox"/> Assignment Papers (<i>cover sheet and document(s)</i>)	
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	Prior Appl. No. _____	
Prior Appl. information: Examiner: Group/Art Unit:		

CORRESPONDENCE ADDRESS					
NAME	Michael Zazzara Attorney for Applicant(s)				
Reg. No.	35,743				
ADDRESS	Motorola, Inc. Intellectual Property Section Law Department 1500 Gateway Blvd				
CITY	Boynton Beach	STATE	FL	ZIP CODE	33426-8292
COUNTRY	U.S.A.	TELEPHONE	(561) 739-2860	FAX	(561) 739-2825

SUBMITTED BY			
NAME	Michael Zazzara	Reg. No.	35,743
SIGNATURE			
DATE	July 21, 2000	Deposit Account User ID	50-0757

CONTROLLING TRANSMIT DUTY CYCLE BY POSITION OF COVER

Related Application

5 This application is related to, and applicants hereby claim the benefit of the prior filing date of, co-pending provisional application No. 60/202,309, entitled "Controlling Transmit Duty Cycle by Position of Cover", filed May 5, 2000, by the identical inventors as the inventors of the present application, and which is hereby fully incorporated by reference herein.

Field of the Invention

10 This invention relates in general to portable, wireless communication devices, and more specifically controlling a duty cycle of the transmitter of a portable, wireless communication device.

Background of the Invention

20 Controlling a duty cycle of a transmitter is generally known; but controlling the duty cycle of a transmitter of a portable, wireless, communications device, such as a pager or a cellular telephone, by a position of a cover or another part of the housing of the device is not known.

25 With portable, wireless communications devices having a cover, the immediate environment of the device is usually different depending upon whether the cover is in an opened position or in a closed position. When the cover is in the opened position, the device is usually being used; and, therefore, the immediate area around the device is clear, except for possibly being held in the a hand of a user. When the cover is in the closed position, the display and/or keyboard are not accessible to a user; and, therefore, the device is often in storage. The immediate area
30 around the device when in storage is less likely to be clear of other objects; and, as a result of the other objects, the propagation of a signal transmitted by the device diminished. Often, the storage location, such as a mobile storage location, is only temporarily detrimental to propagation of transmitted radio signals.

For portable, wireless communications devices operating using a wireless, digital, time-division protocol, transmissions are made in one or more packets of information with each packet comprising a portion of a message. As a result, when the device in mobile storage location is temporarily in a weak signal condition, there is a great probability that, disadvantageously, none of the packets of information will be successfully transmitted. However, if the packets comprising a message were transmitted with a greater period of time between transmissions of packets, it is more likely that some of the packets would be successfully transmitted.

Thus, there is need to control the duty cycle in response to the position of the cover of the device, and thereby, indirectly, to control the duty cycle of the device when the device is likely to be in a storage location, in order to increase the probability that at least some of the packets be successfully transmitted.

Brief Description of the Drawings

FIG. 1 is a perspective view of a battery powered, portable, wireless communications transceiver device in accordance with the invention, with a cover in an opened position.

FIG. 2 is a perspective view of the device of **FIG. 1**, with the cover in a closed position.

FIG. 3 is a timing diagram illustrating the transmission format of a wireless, digital, time-division protocol utilized by the device of **FIG. 1** in accordance with the preferred embodiment of the present invention.

FIG. 4 is a timing diagram illustrating the use of the protocol of **FIG. 3** utilized by the device of **FIG. 1** in accordance with the prior art.

FIG. 5 is a timing diagram illustrating the use of the protocol of **FIG. 3** utilized by the device of **FIG. 1** in accordance with the preferred embodiment of the present invention.

FIG. 6 is a flow diagram showing steps executed by the device of **FIG. 1** with regard to controlling the duty cycle in accordance with the preferred embodiment of the present invention.

Description of a Preferred Embodiment

Referring to **FIG. 1**, a battery powered, portable, wireless communications transceiver device, or device, **10**, has a housing **11** comprising a first portion **12** having a keyboard **13** and a second portion **14** having a display **15**. The second portion **14** also has an antenna **16**. Device **10** has a transmitter (not shown) preferably within the first portion **12**. The transmitter is coupled to the antenna **16**. The device **10** has a controller (not shown), preferably a microprocessor, coupled to the transmitter. The first portion **12** and the second portion **14** are mechanically connected by connection means, preferably a hinge **17**. The second portion is movable into at least two positions, first position and a second position, relative to the first portion. The device **10** has a sensor, preferably an electro-mechanical sensor, (not shown) for detecting whether the housing is in an opened position (cover open) or in a closed position (cover closed). The sensor is coupled, preferably electrically, to the controller. Alternatively, the sensor is coupled, preferably electrically, directly to the transmitter. When the housing **11** is in the opened position as shown in **FIG. 1**, the keyboard **13** can be operated and the display **15** can be viewed. When the housing **11** is in the closed position as shown in **FIG. 2**, the keyboard **13** cannot be operated and the display **15** cannot be viewed. However, the transmitter can be actuated when the housing is in either the opened position or in the closed position. The controller controls the starting and the stopping of the transmitter, i.e., the transmit duty cycle of the transmitter, in accordance with the invention as set forth in more detail herein below.

FIG. 3 is a timing diagram **30** illustrating the transmission format of a wireless, digital, time-division protocol utilized by the device **10** in accordance with the preferred embodiment of the present invention. The device **10** operates using a wireless, digital, time-division protocol, preferably the Global System for Mobile Applications (GSM) protocol, or the Time Division Multiple Access (TDMA) protocol. The GSM protocol has eight time slots **32** per cycle **31** with each time slot having a duration of 577 microseconds. One version of the TDMA protocol has six time slots per cycle with each time slot having a duration of 6.56 milliseconds. In both protocols, the transmission rate varies from four to thirteen kilobits per second. The GSM and TDMA protocols are more fully described in *Digital Cellular*

Communications System (Phase 2+); Multiplexing and Multiple Access on the Radio Path (GSM 05.02 Version 6.5.0 Release 1997), published, 1999, by the European Telecommunications Standards Institute, Valbonne, France, which is hereby fully incorporated by reference herein.

5 Wireless transmissions of a message by (i.e., from) the device are made in one or more packets of information. When a message is transmitted in more than one packet, each packet comprises a portion of the message. Typically, shorter messages are transmitted entirely in one packet, and longer messages are transmitted in more than one packet. However, any message greater than one bit in size can, in general,
10 be transmitted using more than one packet.

FIG. 4 is a timing diagram **40** illustrating the use of the protocol utilized by the device **10** in accordance with the prior art. When, because of the size of a relatively large (i.e., long) message, the entire message cannot be transmitted within a single time slot, prior art methods transmit packets of the message in an assigned time slot in adjacent cycles of the protocol until the entire message is transmitted. For
15 example, prior art devices would transmit packets of the message in time slot #5 of every cycle, without skipping any cycle, until the entire message is transmitted. Therefore, prior art devices transmits the message over a relatively short period, and prior art devices have no capability to spread the transmission of the message over a
20 longer period. The device **10** in accordance with the invention allows the aforesaid prior art method to be used, if the housing is in the opened position. However, unlike the prior art, the device **10** in accordance with the invention can spread the transmission of the packets of the message over a relatively long period, if the housing is in the closed position.

25 **FIG. 5** is a timing diagram **50** illustrating a first example of the use of the protocol utilized by the device **10** in accordance with the preferred embodiment of the present invention. When, because of the size of a relatively large (i.e., long) message, the entire message cannot be transmitted within a single time slot, the device **10** in accordance with the invention advantageously transmits packets of the message in an assigned time slot in non-adjacent cycles of the protocol until the entire message is
30 transmitted, if the housing is in the closed position. In this first example, the device transmits packets of the message in time slot #5 of every other cycle, i.e., the device skips a cycle, until the entire message is transmitted. **FIG. 5** shows the transmission

of packets in time slot #5 of cycle #1, cycle #3 and cycle #5 of the protocol. **FIG. 5** is a simplification for purposes of illustration. The transmission of packets also occurs in succeeding odd-numbered cycles until the entire message is transmitted. The invention is not limited to starting transmissions in slot #1 of a cycle; nor is the invention limited to using odd numbered time slots.

As an alternative example (not shown), the device **10** in accordance with the invention transmits packets of the message in time slot #5 of every third cycle, i.e., the device skips two cycles, until the entire message is transmitted. This method can be generalized to transmitting every n^{th} cycle. The controller of the device receives a signal from the sensor regarding the position (opened or closed) of the housing **11**. The controller is programmable as to whether it responds to the position of the housing **11** and therefore advantageously spreads the transmission of a message over a longer period than prior art methods, or whether it ignores the position of the housing and always transmits a message over a shortest possible period as in the prior art method, regardless of the position of the housing. The controller is also programmable with regard to the value of n . The controller is programmable through use of the keyboard **13**.

FIG. 6 is a flow diagram **60** showing a specific example of the steps of a method executed by the controller of the device **10** in accordance with the invention, when $n = 2$. The method starts at step **61**. At step **62**, the controller determines whether the housing is closed. If the housing is closed, then, at step **63**, the controller sets the device to a pre-set transmit duty cycle of "transmit duty cycle/2", which is pre-stored in the device. At step **65**, the controller causes the transmitter to operate in accordance with the invention, i.e., increasing the period over which a relatively longer message is transmitted. The transmit duty cycle of "transmit duty cycle/2" means that the device doubles the period over which a relatively longer message is transmitted, and that the device transmits packets of the message in a same-numbered time slot of every other cycle, i.e., the device skips a cycle between transmissions, until the entire message is transmitted, similar to the first example, above (see **FIG. 5**).

On the other hand, if, at step **62**, the controller determined that the housing not closed, i.e., is opened, then, at step **64**, the controller sets the device to a pre-set transmit duty cycle of "transmit duty cycle/1", which is also pre-stored in the device, and, in such case, at step **65**, the controller causes the transmitter to operate in the

prior art mode. In either case, the method ends at step 66 after transmissions of all the packets of the message.

The invention is not limited to controlling the transmit duty cycle by the position of the cover of the device 10, but is equally applicable to controlling the transmit duty cycle by a relative position of any portion of the housing 11 of the device relative to another portion of the housing of the device. Furthermore, the invention is not limited to controlling the transmit duty cycle by the relative position of any portion of the housing 11 of the device 10 relative to another portion of the housing of the device, but is equally applicable to controlling the transmit duty cycle based upon whether the device is in a storage location, such as whether the device is in a holster or case.

Advantageously, the transmitter of the device 10 in accordance with the invention rests during all time slots of one or more cycles between the cycles during which the device does transmit. A device in accordance with the invention has the advantage of allowing the battery that powers the device to last longer, and also has the advantage that at least some of packets of a message will be successfully transmitted when the device is in locations of poor transmission, because the probability that the device would be moved between transmissions increases as the interval between transmission of packets increases.

While a detailed description of the preferred embodiments of the invention has been given, it should be appreciated that many variations can be made thereto without departing from the scope of the invention as set forth in the appended claims. For example, the invention is not limited to being used with the Global System for Mobile Applications (GSM) protocol, or the Time Division Multiple Access (TDMA) protocol, but can be used with other time-division protocols. The invention is not limited to controlling the transmit duty cycle by the position of the cover, or flip, of the device, but can be extended to controlling the transmit duty cycle based upon other criteria to determine whether radio signals cannot propagate from the device as readily as when the device in a clear, or open, location.

We claim:

CLAIMS

1. A wireless device for transmitting packets of a message during an assigned time slot of cycles of a time-division protocol, comprising:

a housing, the housing having a first position and a second position; and

a transmitter within the housing, the transmitter transmitting packets of the message in the assigned time slot of adjacent cycles of the protocol when the housing is in the first position and transmitting packets of the message in the assigned time slot of every n^{th} cycle of the protocol when the housing is in the second position.

2. A device for transmitting packets of a message during an assigned time slot of cycles of a time-division protocol, comprising:

a housing, the housing having at least two portions, the at least two portions being movable relative to each other; and

a transmitter within the housing, the device capable of selecting a transmit duty cycle of the transmitter, the transmit duty cycle being dependent upon a position, relative to each other, of the at least two portions of the housing.

3. The device of claim 2, in which the at least two portions of the housing are movable into a first position and a second position, and in which the transmitter transmits packets of the message in the assigned time slot of adjacent cycles of the time-division protocol when the at least two portions of housing are in the first position and the transmitter transmits packets of the message in the assigned time slot of every n^{th} cycle of the time-division protocol when the at least two portions of housing are in the second position.

4. The device of claim 3, including a controller programmable to select a
5 value of n.

5. The device of claim 4, including a keyboard, and in which the
controller is programmable through use of the keyboard.

6. The device of claim 4, including a sensor coupled to the housing, and
to the controller and in which the sensor detects the position of the housing.

7. The device of claim 6, in which the controller receives a signal from
the sensor regarding the position of the housing.

8. In a device having a transmitter and a housing, the housing comprised of two or more portions, at least one portion of the two or more portions movable into a plurality of positions, a method of controlling a transmit duty cycle of the transmitter by a position of the at least one portion of the two or more portions of the housing, comprising the steps of:

storing in the device stored transmit duty cycles of the transmitter, one transmit duty cycle associated with one position of the plurality of positions of the at least one portion of the two or more portions of the housing, another transmit duty cycle associated with another position of the plurality of positions of the at least one portion of the two or more portions of the housing;

determining a current position of the plurality of positions of the at least one portion of the two or more portions of the housing; and

in response to the current position, setting a current transmit duty cycle of the transmitter to one of the stored transmit duty cycles.

9. The method of claim 8, including the step of transmitting at the current transmit duty cycle of the transmitter.

10. In a device having a transmitter and a housing, the housing comprised
of two or more portions, the portions capable of being moved into more than one
5 position relative to each other, a method comprising the steps of:

storing in the device stored transmit duty cycles of the transmitter, one
stored transmit duty cycle associated with one position, another stored
transmit duty cycle associated with another position;

10 determining a current position of the portions;

in response to the current position, setting a current transmit duty cycle
of the transmitter to one of the stored transmit duty cycles; and

15 transmitting at the current transmit duty cycle of the transmitter.

CONTROLLING TRANSMIT DUTY CYCLE BY POSITION OF COVER

Abstract of the Disclosure

5 A battery powered, portable, wireless communications transceiver device (10),
has a housing (11) including a first portion (12) and a second portion (14). The
device has a controller and a transmitter coupled to the controller. Using a digital,
time-division multiple access protocol, the transmitter transmits messages comprised
of packets. The first portion and the second portion are connected by a hinge (17)
10 allowing the device to be put into an opened position or a closed position. The device
has a sensor for detecting whether the housing is in an opened or in a closed position.
The controller of the device receives a signal from the sensor regarding the position
of the housing. The controller is programmable to respond to the position of the
housing and to advantageously spread the transmission of packets of the message
15 over a longer period than prior art methods, when the housing is in the closed
position.

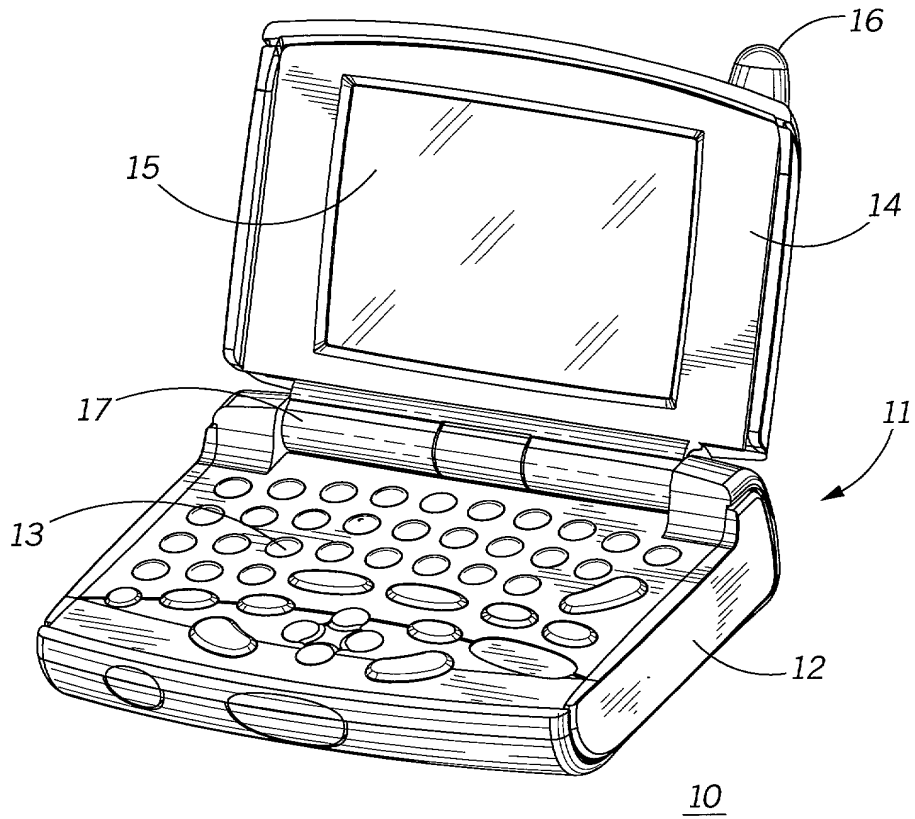


FIG. 1

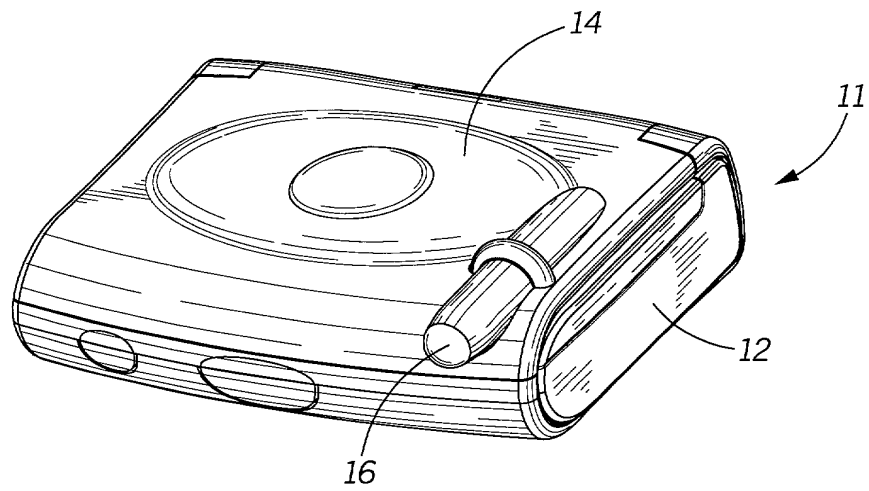


FIG. 2

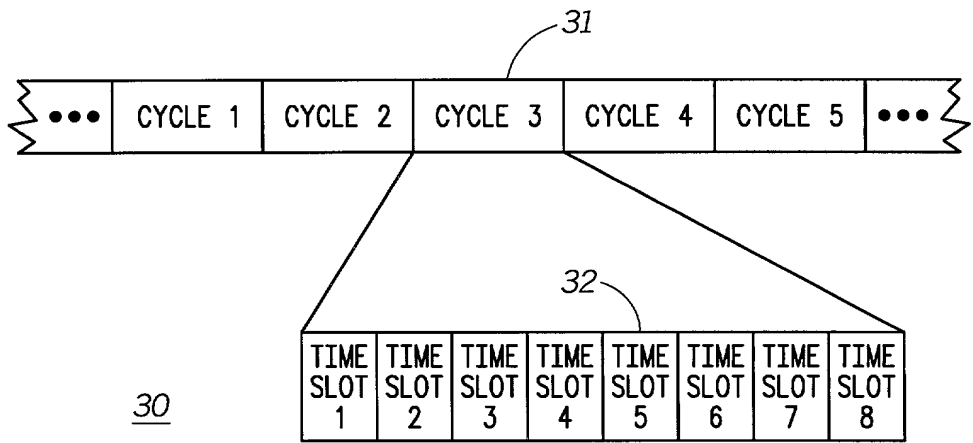


FIG. 3

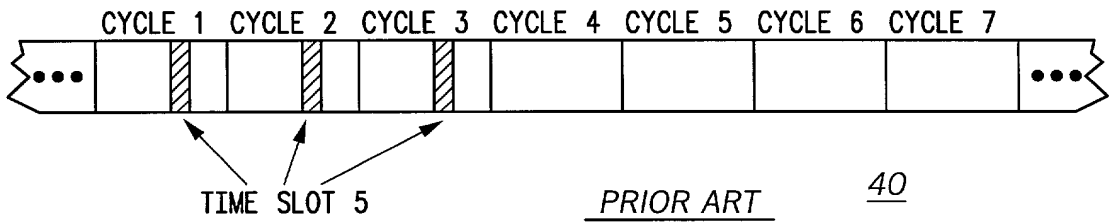
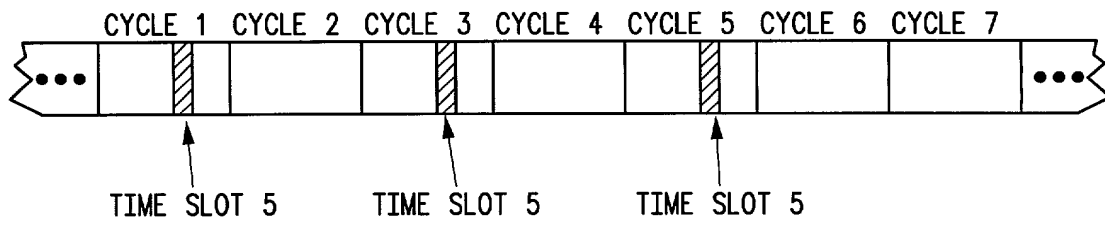
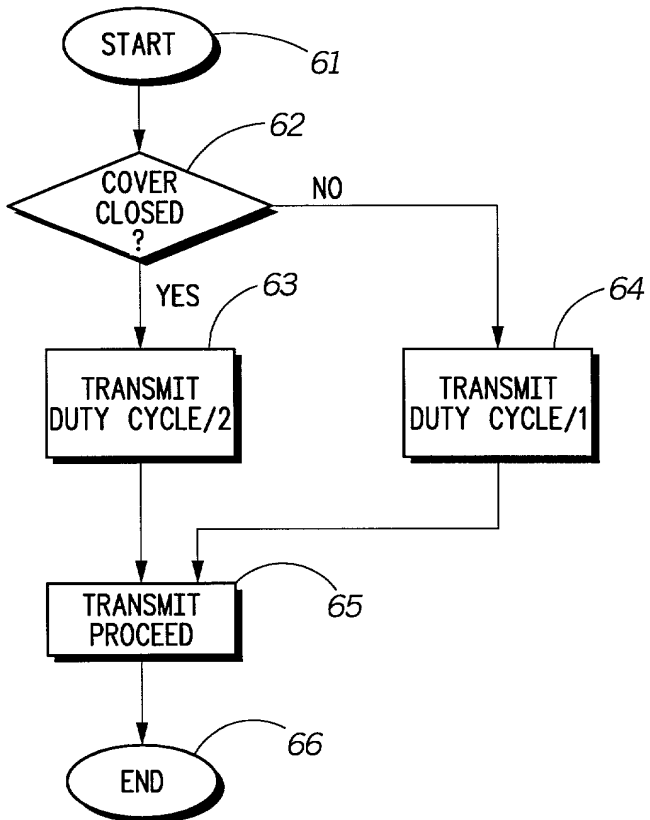


FIG. 4



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FIG. 5

60

FIG. 6

PATENT APPLICATION DECLARATION
COMBINED WITH POWER OF ATTORNEY

Attorney's Docket No.: PT03452U



Regular (Utility)



Design Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

CONTROLLING TRANSMIT DUTY CYCLE BY POSITION OF COVER

the specification of which:



is attached hereto



was filed on: _____

as U.S. Serial No.: _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign/PCT Application(s):



no such application(s) filed



such application(s) identified as follows:

Application Number	Country	Date of Filing (day, month, year)	Priority Claimed Under 37 U.S.C. 119
			<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

Provisional Application Serial No.: 60/202,309

Provisional Application Filing Date: May 5, 2000

I hereby claim the priority benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which is material to the patentability of this application and which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Application(s):



no such application(s) filed



such application(s) identified as follows:

Application No.	Filing Date (day, month, year)	Status (Patented, Pending, Abandoned)

I HEREBY APPOINT THE FOLLOWING ATTORNEY(S) OR AGENT(S) ASSOCIATED WITH **CUSTOMER NUMBER 22926** WITH FULL POWER OF SUBSTITUTION TO PROSECUTE THIS APPLICATION AND TRANSACT ALL BUSINESS IN THE PATENT AND TRADEMARK OFFICE CONNECTED THEREWITH:

NAME(S)	REG. NO.(S)	ASSOCIATE POWER OF ATTORNEY ATTACHED
Steven G. Parmelee	28,790	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
J. Ray Wood	36,062	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Daniel K. Nichols	29,420	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
R. Louis Breeden	37,286	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Charlie Bethards	36,453	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Keith A. Chanroo	36,480	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
James A. Lamb	38,529	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Philip P. Macnak	33,308	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Pablo Meles	33,739	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Gregg E. Rasor	34,413	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Michael Zazzara	35,743	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Randi L. Dulaney	46,148	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No


Send correspondence to:

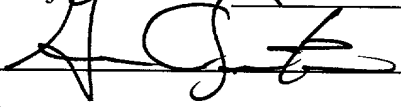
Motorola, Inc.
Intellectual Property Law Department
1500 Gateway Blvd – MS96
Boynton Beach, FL 33426-8292

Attention: Michael Zazzara

Direct telephone calls to: (561) 739-2860
Direct faxes to: (561) 739-2825

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first-named or sole inventor <u>CHUNG TONG</u>		
Inventor's signature	<u></u>	Date <u>7/18/00</u>
Residence	<u>Boynton Beach</u>	<u>FL</u>
	City	State or Foreign Country
Citizenship	<u>United States</u>	
	Country	
Post Office Address	<u>9889 Majestic Way</u>	
	Street Address	
<u>Boynton Beach</u>	<u>FL</u>	<u>33437</u>
City	State or Country	Zip Code

Full name of second-named joint inventor <u>GENE SANTANA</u>		
Inventor's signature	<u></u>	Date <u>7-18-00</u>
Residence	<u>Boca Raton</u>	<u>FL</u>
	City	State or Foreign Country
Citizenship	<u>United States</u>	
	Country	
Post Office Address	<u>811 NE 69th Street</u>	
	Street Address	
<u>Boca Raton</u>	<u>FL</u>	<u>33487</u>
City	State or Country	Zip Code

Full name of third-named joint inventor <u>NAVEED MIRZA</u>		
Inventor's signature <u><i>Naveed Mirza</i></u>	Date <u>7/19/00</u>	
Residence <u>Boynton Beach</u>	FL	
City	State or Foreign Country	
Citizenship <u>Pakistan</u>	Country	
Post Office Address <u>3842 W. Sandpiper Drive, Apt 1</u>		
Street Address		
<u>Boynton Beach</u>	<u>FL</u>	<u>33436</u>
City	State or Country	Zip Code